

Raddi cites "Bert. Excerpta de Re Herb. 14." This paper is not in the library of Washington. In another paper the same year⁴¹ Bertoloni published *Panicum sulcatum* Bertol., citing Raddi's collection from Brazil. This is apparently described independently of *P. sulcatum* Aubl. 1775. Glaziou 17396, Rio Janeiro, though a larger plant, is very like Raddi's specimen.

86. POA BRASILIENSIS. "In sepibus prope Rio de Janeiro." The specimen could not be found. The description is as follows: "panícula elongata stricta, ramis alternis adpressis, spiculis lineari-lanceolatis subdecemfloris, valvula corollae interiore margine brevissime ciliata; foliis bi-aut tripollicaribus, acuminatis, rigidis, margine involutis, ligula nulla. nob. Gramini tremulo affine, paniculatum elegans majus, spicis minoribus et longioribus. Sloan, H. J. p. 113. t. 71. fig. 1? (mala)."

The original of the Sloane figure in the British Museum of Natural History was examined by Dr. A. S. Hitchcock in 1907. It is *Eragrostis cubensis* Hitchc., which is not found in Brazil.

Nees⁴² transfers *Poa brasiliensis* Raddi to *Eragrostis* "excl. synonym. Sloanei." and refers *E. bahiensis* Schrad.⁴³ to it as a form with blades ciliate at base. Short-leaved specimens of this species, such as Capanema 5379, and 5386, Brazil, agree well with Raddi's description. The ligule is not wanting as stated by Raddi, but is very minute.

89. MEGASTACHYA SWAINSONI. "Species rarissima, quam mihi benevole communicavit D. Swainson red. ex itinere Pernambucano ad Urbem Rio-janeiro." The specimen is a small tuft of *Eragrostis maypurensis* (H. B. K.) Steud., with small, somewhat capitate panicles, as in Jardim Botânico do Rio de Janeiro no. 5535, collected by Luetzelburg; 3742, collected by Löfgren, and 5382 collected by Capanema.

BOTANY.—Opsianandra, a new genus of palms growing on Maya ruins in Petén, Guatemala. O. F. Cook, Bureau of Plant Industry.

A palm that grows in the ruined Maya cities of Petén apparently has not been described. The ruins are buried in the forest, with palms and other trees often growing upon the terraces, walls, or roofs of the buildings. The chief center of the early Maya civilization, in the district of Tikal, Uaxactun, Nakum, and Naranjo, is supposed to have been abandoned about fifteen centuries ago, and now is completely

⁴¹ Opusc. Sci. Bologna 4: 230. 1820.

⁴² Agrost. Bras. 497. 1829.

⁴³ In Schult. Mant. 2: 318. 1824.

overgrown with tropical vegetation. The outlook from the high pyramids in all directions is an undulating, unbroken forest. The present conditions are to be considered as a result of reforestation, not only of the sites of the cities, but probably of the whole surrounding region. It is a regular consequence of the primitive system of agriculture to reduce a forest country to an open, fire-swept grassland.¹

Though tropical forests are restored rapidly in small clearings, the reforestation of an extensive grassland necessarily is very gradual, with a long succession of different conditions and types of trees to be established and replaced before there can be a complete return to the original state of the undisturbed, or "virgin forest." Some elements of the forest flora come in very slowly, even after apparently favorable conditions have been established. Thus there may be new forests with no palms in the undergrowth, though several kinds of palms may be found in older forests near by. In more advanced stages of reforestation palms may be abundant, but represent only a few species, which is true of the forests of Petén.²

The rapid destruction of the ancient cities by the forest, now to be witnessed in the Petén region, is evidence against the idea of very great antiquity, estimated by some archaeologists in thousands of years. In view of the damage now being done by the growth and uprooting of large trees, it does not appear that many centuries will be required to reduce all of the massive structures to shapeless mounds. The destruction tends, no doubt, to accelerate as the soil deposits accumulate among the loosened stones and the trees grow to larger size before uprooting. Several centuries may have passed after the cities were abandoned before they were covered by the forest. The dates that have been deciphered from the sculptured monuments are from a period corresponding to the early centuries of the Christian Era, though doubtless the city-building age was preceded by a long period of agricultural development. The Maya system of chronology used in dating the monuments would go back to about 3500 B.C.

The new palm would not be classified ecologically with the undergrowth species, but as a true forest type, growing to the same height as many other trees. It has a rather slender trunk, about 6 inches in

¹ See "Milpa Agriculture, A Primitive Tropical System," Smithsonian Report for 1919, pp. 307-326.

² Of the undergrowth species an *Acanthorhiza* is by far the most abundant, two species of *Chamaedorea* (*C. elegans* and *crnesti-augusti*) are common, and three others of occasional occurrence. Two large forest palms are also very common in some localities, *Attalea cohune* and a very tall, slender palmetto, locally known as *botán*. The *taciste* palm, a species of *paurotis*, grows in open places and survives burning over.

diameter, supported on a solid conical mass of thick roots, and attaining a height of 60 feet or more. The leaves are large and pinnate, but few in number, usually only 5 or 6, with a total length of 8 or 9 feet, and about 90 pinnae on each side of the midrib. The inflorescences are several joints below the leaves, with the branches robust and mostly simple, and ripening into large clusters of red cherry-like fruits, like those of *Synechanthus*.

As the Tikal district is now entirely uninhabited, no uses of the palm were learned, and the only name to be learned was *palma cimarrona*, or "wild palm." At El Cayo, in British Honduras, one informant gave *cambo*, or *kambo*, as the Maya equivalent of *palma cimarrona*. But the palm was not noticed in the vicinity of El Cayo, nor along the Belize River, though it was seen at several places on the road between Flores and Benque Viejo, as well as in the forests to the northward.

Since the fruit and floral characters are those of the Synechanthaceae the new palm may be assigned to this family, which includes only three other genera, *Synechanthus* in Guatemala, *Gaussia* in Cuba, and *Aeria* in Porto Rico. The tall trunk would associate *Opsiandra* with the West Indian genera, but there is no such swelling of the lower part of the trunk as in *Aeria*. Also, *Opsiandra* has 4 spathes, instead of 7 as in *Aeria*, or 2 as in *Gaussia*. Between *Opsiandra* and *Synechanthus* there is little external resemblance, the latter being a short-trunked undergrowth palm with clustered pinnae and slender, fastigate inflorescence-branches.

Diagnostic features of *Opsiandra* are the tall, columnar trunk, the infrafoliar inflorescences, the 4 short, narrow spathes, the thick simple branches of the spadix, the flowers only 2 or 3 in each cluster, the petals thick and valvate in both sexes, the persistent staminate buds, and the transversely reniform seeds, with uniform albumen and a central cavity. The most striking peculiarity is that the inflorescence branches are robust and simple, while in the other genera the branches have numerous slender divisions and the flowers more definitely in rows.

The technical characters of the new genus may be summarized as follows:

***Opsiandra* Cook, gen. nov.**

Trunk solitary, erect, ascending or flexuous, columnar below, slightly and gradually tapering above, scarcely enlarged at the base, supported by a conical mass of very thick roots.

Leaves few, usually 5 or 6, ascending, 2 to 3 meters long, with a cylindrical sheathing base; petiole distinct, deeply channelled below and with strongly

incurved margins above; pinnae numerous (88 pairs), lanceolate, not clustered or grouped, attaining a length of about 60 cm. and a width of nearly 4 cm.

Inflorescences distinctly infrafoliar, slender, with numerous (15 to 30) rather robust, simple, tapering branches, or a few of the lower branches forked near the base.

Spathes 4, slender, incomplete; 3 upper joints of the peduncle without spathes. Lowest spathe short and strongly bicarinate; third and fourth spathes longest, but not attaining the base of the branches of the matured inflorescence.

Flowers of one form externally, in longitudinal rows of 2 or 3, the lowest flower of each group pistillate, somewhat smaller than the staminate flowers, also a few solitary staminate flowers near the ends of the branches; sepals rounded, broadly imbricate; petals broadly triangular, valvate, somewhat longer than broad, thick, fleshy, persistent, becoming leathery in the ripe fruit; stamens 6, on broad short filaments; pistillodes columnar or variously compressed, sharply apiculate, nearly as long as the anthers; pistillate flowers with rudimentary staminodes, the pistil sharply trigonal, on each face a distinct median groove, the mature stigmas divaricate, persistent at the base of the ripe fruit; also some of the staminate buds persistent through the fruiting period.

Fruits globose-reniform, with a distinct groove on the median face above the stigma, color light green, turning to deep red when ripe, with a smooth skin and a soft fleshy pericarp, enclosing a somewhat depressed or subreniform seed. Surface of seed nearly smooth, slightly impressed with 5 to 7 simple or sparingly branched or anastomosing fibers rising from the inner or median side of the hilum, passing over and around the seed and converging toward the embryo; albumen uniform, with a central cavity; embryo about intermediate between basal and lateral, on the outer side of the seed away from the stigma; embryo cavity about half as broad as long, extending more than half-way to the central cavity.

Seedling with three bladeless sheaths, followed by two leaves with simple bifurcate blades.

The generic name refers to the persistence of the staminate flowers and buds which are to be found in fresh condition on the same inflorescences with ripe fruits. This may indicate an extreme condition of proterogyny or a continued production of staminate flowers through a long period. Monoecious palms may be considered as proterogynous if the stigmas are exposed before pollen is shed from the staminate flowers of the same inflorescence. Drude alludes to the opposite relation, of female flowers developed after the male flowers have withered. The difference usually would be only a few hours, or at most a few days, whereas several weeks must be required, or possibly months, for the fruits of *Opsiandra* to grow and ripen, while staminate buds and flowers are still present.

Opsiandra maya Cook, sp. nov.

Trunk attaining 20 meters and upward, about 15 cm. in diameter near the base, tapering slightly and gradually; internodes 12 to 15 cm., becoming shorter above, separated by distinct rings. Superficial roots 3.5 cm. thick, forming a dense conical mass supporting the trunk.

Leaves 2 to 3 meters long; sheath and petiole not distinct, the strictly sheathing portion about 30 cm. long, the petiole about 65 cm., very deeply channelled below, with thin strongly incurved margins to within about 15 cm. of the lowest pinnae, there the groove becoming shallow and the margins rounded. Sheath 1.5 cm. thick at the back, the petiole becoming thicker above and the groove more shallow; diameter of petiole above 3 cm. Rachis sharply carinate above.

Pinnae 88 on one side of the midrib; lowest pinna 41 cm. by 2.2 cm.; second pinna 47 cm. long; largest pinna somewhat below the middle, 61 cm. by 3.8 cm.; fifth pinna from the end 32 cm. by 2.7 cm.; subterminal pinna 22 cm. by 1.3 cm.; terminal pinna 16 cm. by 0.5 cm., or the two last pinnae united with total width of 1.5 cm. One vein on each side of the midrib more prominent than the others, especially underneath, also 5 or 6 less prominent veins, separated by 6 or 7 subequal veinlets; in dry specimens the spaces between the veinlets showing many short translucent longitudinal lines, not in regular rows; submarginal vein delicate, separated from the margin by 3 or 4 veinlets very close together; margin thickened and veinlike, but the edge thin.

Inflorescence 75 cm. long; from lowest branch to tip 34 cm. Branches 17 or 18, about 0.4 cm. thick, at base nearly 0.5 cm. tapering gradually to the tip, attaining 30 cm. The lowest 4 branches divided near the base; terminal portion 21 cm. Peduncle with 7 joints measuring respectively 2, 11, 7.5, 12, 11, 5, and 3 cm., the last 3 joints without spathes.

Spathes 4, the lowest 9.5 cm. by 5.5 cm., distinctly carinate on each side, deeply bidentate, the tips triangular-pointed, 3 cm. long; second spathe 13.3 cm. by 4.3 cm., slightly carinate, but sharply angled at the sides; like the others; third spathe 19.5 cm. by 2.4 cm.; fourth spathe 19 cm. by 2.1 cm., attaining within 2 to 3 cm. of lowest branch, the fruiting portion emerging from the spathes long before flowering.

Sepals about 1 mm. long; petals of female flowers at anthesis about 2 mm. long, on ripe fruits 3 mm. long, thick; anthers 1 mm. long, and pistillodes nearly the same length, staminodes rudimentary.

Fruits subglobose or transversely subreniform, somewhat flattened on one side and with a vertical groove above the stigma, 1 cm. to 1.5 cm. in diameter, with a soft fleshy red pericarp 2 mm. thick, the flesh of green fruit mucilaginous and very sticky; seed 0.9 cm. to 1.1 cm. in diameter, somewhat irregular in shape, subglobose, oblong, reniform, oval, or unsymmetrical, the surface smooth or slightly uneven, marked with a few impressed fibers; central cavity of the seed often strongly depressed, 2 to 4 mm. in diameter, surrounded by a wall of uniform rather hard albumen 2.5 to 3 mm. thick.

Seedlings with the three bladeless sheaths measuring respectively, 7 cm., 2.5 cm. and 5 cm. in length, in diameter about 0.5 cm.; first two sheaths without chlorophyll, white at first but soon brown and decayed; first two leaves simple, deeply bifid, the divisions measuring 12 to 13 cm. by 1.3 to 1.9 cm.

Type in the U. S. National Herbarium, nos. 1,084,215-1,084,219, consisting of leaf parts, inflorescence, and spathes from a single individual growing at Laguna Colorado, Tikal District, Petén, Guatemala, altitude 100 to 500 meters, March 23, 1922, by O. F. Cook and R. D. Martin (no. 94), of which photographs and complete leaf measurements were obtained. Ripe fruits were collected a few days later near Uaxactun, on a larger inflorescence, with more numerous branches and the fruits more abundant and crowded. The seeds of this cluster were brought to Washington and planted in a greenhouse, where the seedlings have grown well.

Young palms were noted among the ruins of Nakum with petioles much longer and more slender than those of the adult palm at Laguna Colorada. Also, in the young palms the pinnae are relatively broader than in the adult, 1.5 to 2 cm. wide with a length of 18 to 20 cm. An injured leaf of a young palm growing on a ruined temple at Uaxactun showed a special enlargement of the basal pulvini, so that the pinnae stood nearly at right angles to the rachis instead of the usual angle of about 50 to 60 degrees in young palms, or about 40 degrees in adults.

Since northern Petén has a dry season sufficiently long and severe to throw most of the vegetation into a dormant condition, it seems not unreasonable to expect that *Opsandra* may prove somewhat resistant in more temperate climates and possibly adapted to household cultivation or to outdoor conditions in Florida or California. As a popular name the expression "Maya palm" might be used, in view of the habitat and frequent association with the ancient ruins.

ZOOLOGY.—*A new frog of the genus Leptodactylus.*¹ DORIS M. COCHRAN, National Museum. (Communicated by Dr. L. STEJNEGER.)

A collection of reptiles and batrachians recently sent to the United States National Museum by Dr. W. L. Abbott contains an interesting new frog, of which I have prepared the following description:

***Leptodactylus dominicensis*, sp. nov.**

Diagnosis.—Toes without distinct dermal margins; tongue heart-shaped; tympanum half the width of the eye; vomerine teeth in two long curved series behind the choanae; snout pointed, depressed, with a sharp edge.

Type.—U. S. N. M. No. 65670, Las Cañitas, Dominican Republic; February 25, 1923; Dr. W. L. Abbott, collector.

Description of type specimen.—Vomerine teeth in two long curved series beginning behind the middle of the choanae, separated by the width of the choanae; tongue moderate in size, heart-shaped; snout pointed, depressed, sharp-edged, declining rapidly from the eyes to the tip; when viewed in profile, upper lip projects considerably beyond lower lip; canthus rostralis sloping and very indistinct; nostrils a little nearer to end of snout than to eye; tympanum longer than high, its greatest diameter very slightly more than half the diameter of eye; interorbital space equals width of upper eyelid; first finger much longer than second, which equals fourth; toes slightly webbed at base; third much longer than fifth; subarticular tubercles well developed; numerous smaller tubercles in series on the sole; two metatarsal tubercles, the inner connected with a very distinct tarsal fold; heels just touching when hind limbs are folded at right angles to axis of body; tarso-metatarsal joint reaching anterior border of tympanum when hind limbs are carried forward along the body; skin smooth above and below; numerous small, pointed glands on the outer surface of the tibia; a narrow dorso-lateral glandular fold, and a few elongate glands on the sides; a strong glandular fold from posterior angle

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